

THURSDAY, MARCH 15, 1900.

SUGARS AND THEIR DERIVATIVES.

Les Sucres et leurs principaux Dérivés. Par L. Maquenne, Professeur au Muséum d'Histoire Naturelle. Pp. ii + 1032. (Paris: Georges Carré and C. Naud, 1900.)

THERE is no class of carbon compounds of greater interest to chemists and biologists than the sugars or, in the wider sense, the carbohydrates which form the subject of Prof. Maquenne's volume. Whether regarded from the point of view of the physiologist, who concerns himself with the part played by these compounds in the vital processes of animals and plants, or whether considered in their chemical aspect, as furnishing the most striking illustrations of the new stereo-chemistry of Le Bel and Van 't Hoff, the sugars will always be found most fascinating subjects for study and research. The great impetus to the development of our knowledge of these compounds, given by the classical researches of Emil Fischer, is one of the most remarkable examples of the interdependence of hypothesis and experiment that can be furnished by modern science—a point which is recognised by the author of the present work in the preface:—

“C'est en effet sur les travaux de E. Fischer que les considérations d'isomérisie dans l'espace ont trouvé leur plus solide appui et la doctrine du carbone asymétrique ses plus sérieuses vérifications.”

The continuously growing knowledge of the carbohydrates resulting from the labours of many chemists and physiologists, renders it impossible for the non-expert student to keep pace with the numerous discoveries which are being announced in rapid succession in the various publications recognised by scientific workers. As with every branch of science in which the rate of development is a measure of its vitality, specialisation must be recognised as a necessary condition of progress, and all workers must be grateful when specialists like Prof. Maquenne go through the laborious process of taking stock of existing knowledge, and of bringing together into a coherent form the scattered information which is otherwise so difficult to obtain without a large library at one's elbow. Such monographs form landmarks in the history of science; if in a few years this or any similar work is found to be behind the actual state of knowledge, it is no disparagement to the author, but an indication of progress which every worker in science cannot but welcome. As examples of the way in which the subject is growing, it may be mentioned that even while the present work has been in the hands of its reviewer, a new synthesis of glucose, fructose and mannose has been made possible by the discovery by Messrs. Fenton and Jackson, that glycollic aldehyde gives a mixture of α - and β -acrose under the influence of alkali; while, still more recently, a transition from glucose to *d*-erythrose and *i*-erythritol *via* *d*-arabinose and *d*-arabonic acid has been effected by Ruff.¹

The name of M. Maquenne is familiar in this department of chemistry, and his qualifications for the task

¹ *Ber. deutsch. ch. Gesell.*, January 1900, vol. 32, p. 3672.

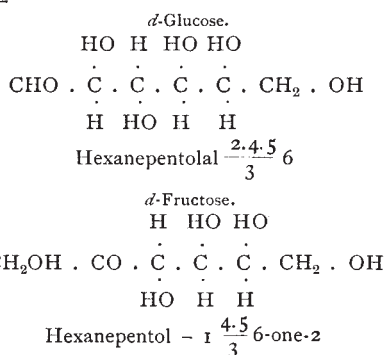
which he has undertaken will be generally admitted. A critical review of such a work as that before us is out of the question; we can only indicate its contents and describe the author's mode of treatment. In classification and logical sequence and general clearness the work is up to that high standard which is characteristic of French writers on scientific subjects. The twenty chapters into which the book is divided are classified under six parts. The first part (two chapters) deals with generalities and syntheses; the second part (six chapters) with the polyatomic (in our nomenclature polyhydric) alcohols classified according to the number of carbon atoms, as tetrates, pentates, hexates, &c.; the third part (four chapters) comprises reducing sugars, again classified as trioses, tetroses, &c.; the fourth part (two chapters) deals with hydrolysable sugars, such as bioses, trioses and polyoses; the fifth part (three chapters) with acid derivatives of the sugars; and the sixth part (three chapters) with miscellaneous compounds, such as osones, osamines and saccharines.

As a work of the present class is, in the first place, valuable as a book of reference, it may be pointed out that there is a fairly ample index alphabetically arranged, the very excellent plan of printing the number of the page containing the main reference to the compound in thick type being systematically adopted. The French custom of printing the table of contents at the end of the volume, instead of at the beginning, appears to us, without prejudice (insular or otherwise), to be a bad one. It will be noticed also that the nomenclature adopted for the “sugars” proper leads to the use of the term triose in two distinct senses—viz. for compounds like glyceraldehyde and dioxyacetone, which contain three atoms of carbon, and for sugars like raffinose and melizitose, which contain three hexose complexes. But these are minor points. The general arrangement of the chapters will be found, on detailed examination, to be carried out on a uniform plan, so that the reader who is searching for any particular kind of information concerning any individual carbohydrate will soon become familiar with the author's arrangement, and will know where to look for such information. We have had occasion frequently to test the book in this way, and, so far as our experience goes, M. Maquenne has never failed us. Beyond this, of course, a reviewer cannot go in praise of the work which has been submitted to his judgment.

The arrangement of the subject-matter is capable of being briefly explained. Each part begins with a chapter of generalities relating to the whole group comprised under the part, and each succeeding chapter treats of the individual compounds in the same systematic way, viz. occurrence and natural history, preparation, synthesis when accomplished, chemical constitution and configuration, physical properties, chemical properties such as action of heat, oxidation, reduction, action of acids, action of bases and salts, action of alcohols (*i.e.* etherification), phenols, aldehydes and ketones, amines, hydrazines, and miscellaneous reagents, fermentability and methods of detection and estimation. From this synopsis, which may be taken as representative for the most complete case of a widely distributed and well-known sugar, such

as *d*-glucose, it is evident that the chemist and physicist, the physiologist, the analyst and the technologist concerned with fermentation industries are all catered for by the author, and in such a way that there should be very little difficulty in finding out what is known concerning any particular sugar or carbohydrate from the special point of view from which the reader consults the volume.

There are a few other points to which attention may be directed. The systematising of the nomenclature, so as to bring the latter into harmony with the stereochemical formulæ, is more complete than has hitherto been attempted in any work dealing with this class of compounds. The numerical system of indicating position in the space-formula is certainly to be commended. We give a couple of examples to illustrate the value of the method:—



Another point which those who have occasion to consult such works will appreciate, is the distribution of the references to original papers among the text, instead of relegating them to footnotes, or, worse still, to the end of the book. Some readers may not agree with this view, but it has been impossible, in writing this notice, to avoid comparing M. Maquenne's volume with a somewhat similar work at present in existence, viz. the "Kurzes Handbuch der Kohlenhydrate," by Dr. Tollens, the first volume of which was published in 1888, and the second in 1895. In the German work the references consist of densely-packed and absolutely bewildering series of pages at the end of the volume, so that in hunting up a reference the reader must turn from the page which he is reading and wade through the serried ranks of numbered references till he finds the one he wants, by which time he will have, no doubt, mislaid the paragraph from which he set out. In making use of such works as the one under consideration, in which the authority for every statement is referred to, it is certainly more convenient to have the references in brackets immediately under the notice of the reader. If the references are not wanted, the reader has only to pass on to the end of the bracket, and begin the following sentence.

This comparison of the French and German works brings out another point, however, in which Dr. Tollens will be found to have the advantage. The complex polyoses, such as starch and cellulose, are treated of much less completely by the French than by the German author, so that in this division Dr. Tollens's book will take precedence as a work of reference. In fact, M. Maquenne refers his readers to the German work for

more complete information on these subjects. The other standard German authority on this subject, "Die Chemie der Zuckerarten," by E. O. v. Lippmann (1895), will find a serious rival in the present work.

In favourably recommending this latest contribution to the chemical literature of the carbohydrates to the attention of English chemists as a work of the greatest value to the general student, and as indispensable to the specialist; we have only to utter the caution—perhaps somewhat unnecessarily,—that M. Maquenne does not profess to deal with his subject from the technological point of view. It may prevent disappointment if we point out that the manufacturer who is seeking for information concerning construction of plant, processes of extraction, refining, and so forth, will have to look elsewhere for guidance. Of the general value of the present volume as a literary production, we have only to say that the information given is complete, accurate, and up to date. The only omission that we have been enabled to detect relates to *d*-mannose, of which the author says (p. 559):—

"Malgré ses rapports avec celle-ci [*d*-mannite] et ses analogies de constitution avec le glucose et le lévulose, il ne paraît exister chez les plantes, comme le galactose, qu'à l'état de *mannosides* complexes," &c.

The occurrence of free mannose in plants is, therefore, not recognised by M. Maquenne. Nevertheless, Messrs. Tsukamoto, Tsuji, and Kinoshita are said to have extracted this sugar from the stalks of the Japanese *Amorphophallus konjak*, and Messrs. Flatau and Labbé have recently announced that the sugar contained in orange peel is mannose.¹ The author may have overlooked these statements, or he may not accept them; at any rate, it seems worth while calling attention to the omission.

R. MELDOLA.

A NEW BOOK ON MAN.

The Races of Man: an Outline of Anthropology and Ethnography. By J. Deniker. With 176 illustrations and two maps. Pp. 611. (London: Walter Scott, Ltd., 1900).

THE Contemporary Science Series has been enriched by the addition of this very valuable work on general anthropology by Dr. J. Deniker, the distinguished Chief Librarian of the Museum of Natural History in Paris, who is well known for his original contributions to that science. Dr. Deniker has read widely, and at various times has systematised the writings of others. These are necessary qualifications for the writer of a general survey of the science of man; but in addition, our author has made investigations in various departments of physical anthropology which give a precision to his treatment, and this element of first-hand knowledge causes the reader to feel more reliance on his judgment than might otherwise have been the case.

The book is fairly evenly divided between a summary of the scope of physical anthropology and ethnography, and a systematic account of races and peoples. The former section deals with somatic characters, such as the distinctive characters of man and apes, the morpho-

¹ *Bull. Soc. Chim.* [3] xix. 408.